Correlational study of substance use disorders and undiagnosed neurodevelopmental disorders in young adult college students

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Abstract

In the last 2 years, in the United States, there has been a significant increase in substance abuse for young adults. Individuals with neurodevelopmental disorders (i.e., Attention Deficit/Hyperactive Disorder [ADHD], Autism Spectrum Disorder [ASD]) are often diagnosed with co-occurring substance use disorders. This study is focused on screening 200 young adults (ages 18 to 25) who are college students in the USA for substance use disorders [SUD] and for ADHD and ASD. The measures were presented in the native language of the participants (English) with an option for Spanish. The hypothesis is that scores on the TAPs Tool 1 & 2, which measure symptoms of SUDs, will be positively correlated to screening measures for ADHD and ASD (ASRS-vI.I and AQ-10 short). There is a strong positive correlation between substance use and neurodevelopmental disorder symptoms.

Keywords: Substance Abuse; Neurodevelopmental Disorders; ADHD; ASD; Young Adult; College; Student

1. Introduction

Substance abuse is a pressing issue in the United States. With high rates of substance use, binge drinking, opiate use, and hallucinogen use, this issue only continues to get worse. The highest population of those who use are those in college age (early to mid-20s). Alongside these issues, there has been a surge in the diagnosis of attention deficit hyperactivity disorder (ADHD) and Autism spectrum disorder (ASD).

2. Hypotheses

There will be a positive correlation between ADHD symptoms with substance abuse symptoms. There will be a positive correlation between ASD symptoms and substance abuse symptoms. There will be a positive correlation between gender or age with the presence of a neurodevelopmental disorder.

3. Literature review

According to the American Psychological Association, roughly 10% of Americans suffer from attention deficit hyperactivity disorder with 2.5% being adults (Simon et al., 2009) and 1 in 36 children have been identified with autism spectrum disorder (Maenner et al., 2023). Substance use disorders (SUDs) are increasingly prevalent in the United States with 18–25-year-olds being the age group that is most likely to initiate in substance use and, subsequently, experience SUDs (Lu et al., 2023). These populations are very susceptible to substance use disorders in both countries (Ressel et al., 2020; Srichawla et al., 2022).

3.1 Attention Deficit Hyperactivity Disorder

Attention deficit hyperactivity disorder (ADHD) is characterized by its debilitating nature as it impacts aspects of daily life including interpersonal relationships, academic and professional achievements, and daily living skills (Harpin, 2005). The symptoms of ADHD are inattentiveness, lack of concentration, disorganization, forgetfulness, misplacing items, difficulty completing tasks with 2 subtypes that present differently (Magnus et al., 2023). The 2 common subtypes are ADHD-I (ADHD with the subtype of inattention) and ADHD-H (ADHD with the subtype of hyperactivity). Inattention presents with an inability

to focus, struggling to listen when spoken to, difficulty organizing tasks and activities, easily distracted, forgetful, frequent misplacement or loss of items (American Psychiatric Association, 2022). Hyperactivity presents with an inability to sit still, is often seen constantly moving or "on the go", difficulty waiting, often interrupts, and restlessness (American Psychiatric Association, 2022). ADHD is prevalent in 2-3% of adults in the world with ADHD-I being the most prevalent form of ADHD in adults (Williams et al., 2023; Ayano et al., 2023).

3.2 Autism Spectrum Disorder

Autism spectrum disorder (ASD) is characterized by its deficits in social communication and the presence of restricted interests and repetitive behaviors (Hodges et al., 2020). Something that makes ASD special is the range with which the symptoms can vary (thus being a "spectrum"). While these symptoms present early in childhood, they carry on through life. ASD affects critical areas of functioning which includes social and occupational domains (Hodis et al., 2025). An early diagnosis of ASD is incredibly beneficial for lessening or negating some of the negative symptoms of ASD but there are many cases where adults find out they have the symptoms of ASD without having realized. In cases like these, an official diagnosis and treatment is beneficial for giving individuals an easier day-to-day life.

3.3 Substance Use Disorders

Substance abuse, as defined by the DSM-5, is a series of disorders of varying severity with the main characteristic being taking a substance (alcohol, cannabis, caffeine, hallucinogens, inhalants, opioids, sedatives, hypnotics, or anxiolytics, tobacco, or other/unknown substances) in excess (American Psychology Association, 2022). Substance Use Disorders (SUDs), refer to a cluster of cognitive, behavioral, and physiological symptoms indicating that an individual continues using a substance despite significant substance-related problems. SUDs encompass dependence on or abuse of drugs and alcohol, ranging from mild to severe, and are often characterized by impaired control, social impairment, risky use, and pharmacological criteria such as tolerance and withdrawal (Hasin et al., 2013). These disorders significantly impact physical and mental health, social relationships, academic success, and occupational functioning.

3.3.1 ADHD and SUDs

ADHD is associated with increased risk for substance use and misuse. Multiple studies have demonstrated that individuals with ADHD are more likely to engage in early substance use and develop substance use disorders (SUDs) (Lee et al., 2011). This risk is compounded when using stimulant medications such as methylphenidate and amphetamine salts, which, while effective in managing symptoms, are often misused by individuals both with and without ADHD diagnoses in academic settings to enhance focus and productivity (Benson et al., 2015).

ADHD and SUDs are commonly co-occurring disorders. Studies have found that individuals with untreated ADHD are at a significantly higher risk of developing SUDs compared to those receiving pharmacological and behavioral interventions (Wilens et al., 2011). Additionally, substance use serves as a form of self-medication for untreated ADHD symptoms, specifically in environments where academic and social demands are high.

Furthermore, college students with ADHD may experience social challenges that increase their vulnerability to substance use. ADHD-related impulsivity and executive function deficits contribute to poor decision-making and increased susceptibility to peer pressure, which facilitates substance use. Peer pressure is more common and easier to succumb to in situations of high stress such as college (Mathew & Simon, 2024). Difficulty forming and maintaining relationships, feelings of isolation, and the desire to fit into peer groups may lead some students to experiment with substances as a coping strategy or to gain social acceptance (Molina & Pelham, 2014). The structure and demands of college life can exacerbate ADHD symptoms, making substance use appear to be a viable short-term solution despite its long-term consequences.

3.3.2 ASD and SUDs

Recent research has highlighted an association between ASD and substance use. Although historically it was believed that individuals with ASD had lower rates of substance use compared to the general population, newer studies suggest that this may not be universally true (Ramos et al., 2013). Some individuals with ASD, particularly those without intellectual disabilities and those who are more socially

motivated, may be vulnerable to substance use as a means of coping with social anxiety and/or sensory overload (Butwicka et al., 2017). Others may use substances to conform to peer norms or to facilitate social interactions.

A major issue that complicates the relationship between ASD and SUDs is the underdiagnosis and misdiagnosis of ASD, especially among females and minority populations. Many individuals with ASD go undiagnosed until adulthood, if at all, due to gendered expectations of behavior and limited awareness of the varied presentations of the disorder (Loomes et al., 2017). This delay in diagnosis can result in years of unsupported struggles, during which substance use may become a maladaptive coping mechanism.

College students with undiagnosed ASD are particularly vulnerable to SUDs. Many may not have access to accommodations or targeted support services. They struggle with executive functioning, managing stress, and forming meaningful social relationships. These factors can contribute to increased substance use risk. Additionally, substance use may mask or exacerbate core symptoms of ASD, leading to further diagnostic delays and treatment complications.

3.4 Underdiagnosis

ADHD and Autism are severely underdiagnosed in both children and adults and there is very limited research on the subject of these neurodevelopmental disorders. According to a study addressing the demographic differences with and without ASD, approximately 25% of the 4,498 children (1,135) had ASD indicators without an ASD diagnosis (Wiggins et al., 2019). These values are taken from diagnosed individuals under the age of 18. An estimated 4.4% of people ages 18 to 44 have ADHD but have not been diagnosed (Barterian, 2024) and autism spectrum disorder is severely under-diagnosed in both children and adults.

3.5 Substance use in college students

In 2022, there was an 8% increase in the prevalence of alcohol use in college students between the ages of 18-22 (80.5 % vs 72.7 %) in the United States (Pasman et al., 2024). With substances being a common way of engaging socially in college, the use of substances is incredibly high (Welsh et al., 2019).

SUDs are notably prevalent among college populations. The unique stressors of academic life, social pressures, and increased independence contribute to high rates of substance use among students (Schulenberg et al., 2018). Alcohol remains the most commonly used substance on college campuses, with binge drinking posing a major concern (Johnston et al., 2021). However, the misuse of prescription medications, particularly stimulants and opioids, as well as the increasing use of cannabis and other illicit drugs, reflect a broader trend of substance experimentation and dependence during this critical developmental stage.

Alcohol is the most common substance used on college campuses, with binge drinking—defined as consuming five or more drinks for men, or four or more drinks for women within two hours—being especially prevalent (Wechsler et al., 2002). Despite awareness campaigns, binge drinking continues to be associated with risky behaviors such as unprotected sex, academic underperformance, injury, and alcohol poisoning. Cannabis use has also risen, particularly in states where recreational use is legal, contributing to increased concern about its impact on cognitive functioning and mental health (Schulenberg et al., 2018).

Prescription drug misuse is another alarming trend, especially the nonmedical use of stimulants like Adderall and Ritalin. Students may use these substances to enhance academic performance, manage stress, or cope with sleep deprivation (Arria & DuPont, 2010). However, non-prescribed stimulant use is linked to negative outcomes such as dependence, cardiovascular complications, and psychological distress. Similarly, the misuse of opioids and anti-anxiety medications poses risks for overdose and long-term health consequences.

Psychosocial factors influencing substance use in college include peer norms, family history of substance use, mental health challenges, and poor coping strategies. Students who report symptoms of depression, anxiety, or trauma are more likely to engage in substance use as a form of self-medication (Buckner et al., 2008). Additionally, students who lack strong social support systems or who feel disconnected from campus life may be more vulnerable to substance misuse. The academic environment also plays a critical role. High-pressure programs, competitive grading systems, and limited access to academic resources may push students toward substances perceived to boost concentration or reduce stress (Broman et al., 2005). This performance-oriented culture can normalize the use of cognitive enhancers and blur the lines between therapeutic use and recreational misuse.

3.6 Substance use and neurodevelopmental disorders: comorbidity

Substance use disorders have been found to be extremely common in those with ADHD with Nicotine dependence being substantially more common in adults with ADHD (40%) compared to the general population (26%) (Sullivan & Rudnik-Levin, 2001). The risk of substance related problems in patients with ASD is almost twofold compared to non-ASD populations with ADHD only worsening the risks (Walhout et al., 2022).

Individuals with neurodevelopmental disorders exhibit elevated rates of substance use, misuse, and substance use disorders (SUDs) compared to their neurotypical peers. This heightened vulnerability stems from a confluence of biological, psychological, and social factors that complicate diagnosis, treatment, and recovery (Capusan et al., 2019).

In individuals with ADHD, impulsivity, poor executive functioning, and a tendency toward novelty-seeking behavior contribute significantly to the initiation and escalation of substance use. Research suggests that untreated ADHD is associated with earlier onset of substance use and increased risk of SUDs in adolescence and adulthood (Wilens & Spencer, 2010). Furthermore, those with ADHD may engage in substance use as a form of self-medication to alleviate symptoms of inattention, restlessness, or mood instability. Stimulant medications used to treat ADHD, such as methylphenidate and amphetamines, have paradoxically been found to reduce the risk of later SUDs when properly prescribed and monitored (Biederman et al., 2008).

ASD presents a contrasting profile where individuals with ASD have historically been thought to have lower rates of substance use due to social withdrawal or rigid routines, recent findings challenge this assumption. Research indicates that high-functioning individuals with ASD may use substances to cope with social anxiety, sensory overload, or to fit into social environments (Butwicka et al., 2017). The presence of co-occurring psychiatric conditions such as anxiety and depression further increases the risk of substance use within this population.

Unfortunately, systemic barriers often hinder effective care. Many treatment programs are not equipped to address the unique needs of neurodiverse individuals. Limited clinician training, stigma, and insufficient integration between mental health and substance use services contribute to poor outcomes and high rates of treatment dropout (Kronenberg et al., 2014).

Among students with neurodevelopmental disorders, including ADHD and ASD, the risk for developing SUDs is often heightened. This vulnerability stems from a variety of factors such as poor impulse control, increased anxiety or depression, social isolation, and the use of substances as a means of self-medication (Wilens et al., 2011). Individuals with co-occurring mental health conditions or undiagnosed neurodevelopmental issues may also be more prone to engaging in substance use behaviors.

The neurobiological foundations of SUDs further complicate treatment and prevention efforts as chronic substance use alters brain circuits involved in reward, stress, and self-control, leading to compulsive drug-seeking behavior. Changes in the Basal Ganglia, Prefrontal Cortex, and the Amygdala are often present in those who chronically use substances (Office of the Surgeon General, 2016). For individuals with preexisting neurodevelopmental conditions, these changes may exacerbate cognitive deficits and emotional dysregulation, making recovery more challenging (Koob & Volkow, 2016).

Environmental and psychological stressors—such as academic pressures, financial burdens, and disrupted support systems—often trigger or sustain substance use in college students. The normalization of drug and alcohol use in college culture can make it difficult for students to recognize problematic behavior, while stigma and fear of academic consequences may deter help-seeking.

4. Objectives

The objective of this study is to identify a possible correlation between substance abuse symptoms and disorders and undiagnosed neurodevelopmental disorders (ADHD and ASD). The purpose being to identify whether a correlation exists and possible intervention and prevention methods. With the high rates of undiagnosed neurodevelopmental disorders and substance abuse disorders, the findings of this study represent an unprecedented necessity to reassess and evaluate neurodevelopmental disorders as they pertain to substance abuse disorders.

5. Methods

This correlational study consists of a survey that seeks to identify possible substance abuse issues coupled with undiagnosed neurodevelopmental disorders, namely, autism spectrum disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD).

5.1 Participants

The target population is 200 young adults within the ages of 18-25 from the United States. Participants would be recruited using social media (e.g. X, Facebook, & Instagram) and Amazon Mechanical Turk (MTurk) using CloudResearch. Those who were recruited via CloudResearch and received $1.33 cents to complete the survey. The survey was completed entirely online, presented all at once, and completely anonymous.

***5.2** Instrument*

The survey was presented with SurveyMonkey. The survey consisted of demographic questions (gender, education, where they live, where they are from, education level, and college enrollment) and validated measures of ASD, ADHD, and Substance Abuse Disorder. Participants were asked about their history with neurodevelopmental disorders (Have you ever been diagnosed with a neurodevelopmental disorder (autism spectrum disorder (ASD) or Attention Deficit Hyperactivity Disorder (ADHD) or whether they suspect that they may have one. The participants were asked to complete several validated measures as detailed below.

The Tobacco, Alcohol, Prescription medications, and other Substance (TAPS) Tool (Part 1): The measure consists of a 4-item screening for tobacco use, alcohol use, prescription medication misuse, and illicit substance use in the past year. The responses range from "Daily to Almost Daily" to "Never". Question 2 is only answered by males and Question 3 was only answered by females. The TAPS-1 tool is a screener adapted from the National Institute on Drug Use (NIDA). It is a quick screen with items assessing the frequency with which one partakes in tobacco, alcohol (4+ or 5+ drinks for females and males, respectively), prescription medication, and illicit substances (e.g., marijuana, cocaine, methamphetamine, hallucinations) (Carter et al., 2021). Any responses besides "never" on the TAPS-1 will indicate a positive screen usually requires the TAPS-2 but for the sake of data collection, both were utilized in tandem (McNeely et al., 2016).

The purpose of this measure is to identify a participant's history with substance use within the last year. The TAPS-1 tool is highly accurate in identifying unhealthy substance use habits with high reliability and validity. The frequency-of-use cut-points on the TAPS-1 tool for identifying Substance Use Disorders were greater than or equal to monthly use for tobacco and alcohol (sensitivity = 0.92 and 0.71, specificity = 0.80 and 0.85, AUC = 0.86 and 0.78, respectively) and any reported use for illicit drugs and prescription medication misuse (sensitivity = 0.93 and 0.89, specificity = 0.85 and 0.91, AUC = 0.89 and 0.90, respectively) (Gryczynski et al., 2017). The reliability was reported as sensitivity and was showed after the first and second administration of the measure for tobacco (0.93/0.81 vs. 0.90/0.79) alcohol (0.73/0.83 vs. 0.69/0.87), illicit drugs (0.91/0.84 vs. 0.95/ 0.87), and prescription medication misuse (0.86/0.87 vs. 0.93/0.94). The predictive validity of the self-administered TAP for alcohol was 0.47/0.97, tobacco was 0.70/0.99, 0.32/0.99, illicit drugs was 0.63/0.98.

The Tobacco, Alcohol, Prescription medications, and other Substance (TAPS) Tool (Part 2): The measure consists of a 9-item "Yes" or "No" questionnaire for tobacco, alcohol, and illicit substance use and prescription medication misuse in the past 3 months only. The TAPS-2 tool is a continuation of the TAPS-1 that is administered after any response besides "never" is chosen in the TAPS-1. The TAPS-2 is adapted from the Alcohol, Smoking, and Substance Involvement Screening Tool (ASSIST)-Lite including 3-4 yes/no questions for each class of substances assessing level of use, dependence, and concern from others (McNeely et al., 2016).

The purpose of this measure is to identify the participant's history of substance use in the last 3 months. The reliability was reported as sensitivity and showed administration for tobacco (0.93/0.81 vs. 0.90/0.79) alcohol (0.73/0.83 vs. 0.69/0.87), illicit drugs (0.91/0.84 vs. 0.95/ 0.87), and prescription medication misuse (0.86/0.87 vs. 0.93/0.94). The predictive validity of the self-administered TAP for alcohol was 0.47/0.97, tobacco was 0.70/0.99, 0.32/0.99, illicit drugs was 0.63/0.98 (Gryczynski et al., 2017).

Adult ADHD Self-Report Scale (ASRS-v1.1): The measure consists of 18-items split into two parts (A and B). Parts A and B consist of multiple-choice questions asking how the participant has felt with responses ranging from "never" to "very often" in the past 6 months. The ASRS-v1.1 is an instrument consisting of the 18 DSM-IV-TR criteria with 6 of the 18 questions being found to be the most predictive of symptoms consistent with ADHD (van de Glind et al., 2013).

The purpose of this measure is to identify symptoms with strong correlations to a diagnosis with attention deficit hyperactivity disorder (ADHD). The reliability was reported as having Cronbach's α for the factor-based scales in the range 0.63–0.72 (Kessler et al., 2007).

Adult Autism Spectrum Quotient (AQ-SHORT) – Self-administered: The measure consists of a 28-item survey that utilizes a 4-degree Likert Scale (Definitely Agree, Slightly Agree, Slightly Disagree, Definitely Disagree) with only 1 point being scored for each question (Kent et al., 2018). The purpose of this measure is to identify symptoms of autism spectrum disorder (ASD). Reliability was reported as Cronbach's α being between .77 and .86 the broad Social behavior factor (α between .79 and .86) and the Numbers/patterns factor (α between .67 and .73) (Hoekstra et al., 2011).

5.3 Procedure

Participants were recruited using CloudResearch. The participants were directed to SurveyMonkey to issue their consent to be in the study as well as be presented with an exclusionary question to be redirected outside the survey. The question prevents anyone outside the ages of 18 and 25 from participating. Demographic questions regarding age, education level, employment status, ethnic background. Two questions regarding an existing history with neurodevelopmental disorders are issued. The participants were then provided with 3 separate pages of multiple choice and yes/no items for a total of no more than 40 questions from the TAPS-1, TAPS-2, ASRS v1.1, and the AQ-10. The entire survey took 5-10 minutes to complete.

6. Results

A total of 193 participants were surveyed (n=79 (female), n=70 (male), n=6 (non-binary), n=3 (trans male), n=1 (trans female)). The participants ranged in age from 18 to 25 (most participants reported being between the 24 years of age). The participants reported having experience in college (n=165, n=90 (current student), n=5 (not current/never attended), n=11 (some experience), n=58 (have completed/have some college experience), n=1 (no answer)). Table 1 gives the full demographics for the participants.

Table 1.

Demographics

Variables	*N*=193	Frequency
Gender	Males	70
	Females	79
	Non-Binary	6
	Trans male	3
	Trans female	1
Education	Current Student	90
	Not Current Student	5
	Some College Experience	11
	Completed college/university	58
	No Answer	1
Ethnicity	American Indian/Alaskan Native	1
	Asian or Asian American	26
	Black or African American	26
	Hispanic or Latino	22
	Middle Eastern or North African	2
	White	79
	Other	2
Suspected Diagnosis	Very Likely	17
	Likely	24
	Neither Likely nor Unlikely	32
	Unlikely	41
	Very Unlikely	45
Confirmed Diagnosis	Diagnosed	23
	Undiagnosed	135

Using Pearson Correlation, there was a significant positive correlation between the TAPS Tool 1 and ASRS, $r(193)= .36$, $p < .001$. There was a significant positive correlation between the TAPS Tool 1 and AQ-10, $r(193)= .355$, $p < .001$. There was a significant positive correlation between the TAPS Tool 2 and

ASRS, r(193)= .437, p < .001. There was a significant positive correlation between the TAPS Tool 2 and AQ-10, r(193)= .371, p < .001. Table 2 shows these results.

Table 2.

Correlations

		TAPS1TOTAL	TAPS2TOTAL	ASRSTOTAL	AQTOTAL
TAPS1TOTAL	Pearson Correlation	1	.761**	.361**	.355**
	Sig. (1-tailed)		<.001	<.001	<.001
	N	193	193	193	193
TAPS2TOTAL	Pearson Correlation	.761**	1	.437**	.371**
	Sig. (1-tailed)	<.001		<.001	<.001
	N	193	193	193	193
ASRSTOTAL	Pearson Correlation	.361**	.437**	1	.561**
	Sig. (1-tailed)	<.001	<.001		<.001
	N	193	193	193	193
AQTOTAL	Pearson Correlation	.355**	.371**	.561**	1
	Sig. (1-tailed)	<.001	<.001	<.001	
	N	193	193	193	193

**. Correlation is significant at the 0.01 level (1-tailed).

A simple linear regression analysis was conducted to evaluate the extent to which the ASRS-v1.1 and AQ-10 could predict the TAPS-1. A significant regression was found F(2 , 190) = 18.64, p <.001. The R2 was .164, indicating that TAPS-1 explained approximately 16% of the variance in ASRS-v1.1 and AQ-10. The regression equation was: TAPS-1 = .24 + 2.94 ASRS-v1.1 + .22 + 2.78 AQ-10. That is, for each one unit of increase in ASRS-v1.1 and for every one unit of increase in AQ-10 the predicted TAPS-1 increased by approximately 2.94 and 2.78, respectively. Confidence intervals indicated that we can be 95% certain that the slope to predict TAPS-1 from ASRS-v1.1 and AQ-10 is between 0.30 and 0.73 and 0.152 and 0.433, respectively. The results are shown in Table 3 below.

Table 3.

TAPS-2 Regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	.723	.210		3.434	<.001	.307	1.138		
	ASRSTOT	.091	.031	.236	2.944	.004	.030	.152	.686	1.459
	AQTOTAL	.253	.091	.223	2.778	.006	.073	.433	.686	1.459

a. Dependent Variable: TAPS1TOTAL

A simple linear regression analysis was conducted to evaluate the extent to which the ASRS-v1.1 and AQ-10 could predict the TAPS-2. A significant regression was found F(1 , 190) = p = .02. The R2 was .21, indicating that TAPS-2 explained approximately 21% of the variance in ASRS-v1.1 and AQ-10. The regression equation was: TAPS-2 = .333 + 4.29 ASRS-v1.1 + .19 + 2.38 AQ-10. That is, for each one unit of increase in ASRS-v1.1 and for every one unit of increase in AQ-10 the predicted TAPS-2 increased by approximately 4.29 and 2.38, respectively. Confidence intervals indicated that we can be 95% certain that the slope to predict TAPS-2 from ASRS-v1.1 and AQ-10 is between 0.12 and 0.29 and 0.05 and 0.584, respectively. The results are shown in Table 4 below.

Table 4.
TAPS-2 Regression

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	.536	.310		1.729	.085	-.075	1.147		
	ASRSTOTAL	.195	.046	.333	4.287	<.001	.106	.285	.686	1.459
	AQTOTAL	.319	.134	.185	2.376	.018	.054	.584	.686	1.459

a. Dependent Variable: TAPS2TOTAL

7. Discussion

This study sought to examine whether a correlation exists between symptoms of substance use disorders (SUDs) and undiagnosed neurodevelopmental disorders, namely, attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) in young adult college students. The findings demonstrated statistically significant and positive correlations between both ADHD and ASD screening measures (ASRS-v1.1 and AQ-10) and both parts of the TAPS tool. Specifically, the results indicated that students with higher ADHD and ASD symptom scores were more likely to report substance use patterns that align with the risk of a substance use disorder.

The results of this study also support the current research of the comorbidity of neurodevelopmental disorders and substance abuse, especially in populations undergoing high levels of psychological and social stress, such as college students (Wilens et al., 2011; Butwicka et al., 2017). The correlation between ASRS-v1.1 scores and TAPS responses also supports earlier findings that individuals with untreated or undiagnosed ADHD are more likely to engage in substance use as a form of self-medication, particularly in high-pressure academic environments where executive functioning and sustained attention are essential (Meinzer et al., 2020; Molina & Pelham, 2014).

Similarly, the significant correlation between AQ-10 scores and TAPS measures suggests that individuals who report symptoms consistent with ASD are also at an elevated risk of substance use. Earlier literature has often portrayed individuals with ASD as less likely to engage in substance use due to their social withdrawal and rigid behaviors (Ramos et al., 2013), but more recent research suggests that high-functioning individuals or those with social motivation may use substances to mask their difficulties or cope with sensory and social stressors (Butwicka et al., 2017; Walhout et al., 2022). This research aligns with the findings of this study, which indicates that a subset of students with ASD traits may be vulnerable to using substances as maladaptive coping mechanisms in a college environment.

The regression analysis provides further support for the relationship between ASD, ADHD, and substance use. Both ASRS-v1.1 and AQ-10 scores were predictive of TAPS-1 and TAPS-2 scores, indicating that neurodevelopmental symptoms can account for a meaningful proportion of the variance in substance use behaviors. Although the predictive power (R^2 values of 16% for TAPS-1 and 21% for TAPS-2) suggests that other factors also contribute to substance use, these values are substantial given the complex and multifactorial nature of both SUDs and neurodevelopmental disorders. The confidence intervals around the regression coefficients also confirm the robustness of these findings.

The findings of the regression have both theoretical and practical implications. Theoretically, the study supports the self-medication hypothesis in ADHD populations, which posits that individuals may use substances to compensate for or manage their symptoms (Sullivan & Rudnik-Levin, 2001). Impulsivity, a core feature of ADHD, may lead to risky decision-making and experimentation with substances (Lee et al., 2011). Additionally, social rejection or academic failure—both common experiences among college students with ADHD and those with ASD—may further drive substance use as a maladaptive coping mechanism.

The data underscores the importance of implementing early screening and intervention programs in college settings. Routine screening for ADHD and ASD traits, especially in students who exhibit signs of substance use, could identify those at risk before SUDs fully develop. Currently, college mental health services may overlook undiagnosed neurodevelopmental disorders, focusing instead on depression and anxiety. While those conditions are also critical, they often overlap with or mask symptoms of ADHD and

ASD (Capusan et al., 2019; Loomes et al., 2017). By incorporating neurodevelopmental screenings into routine mental health assessments, institutions can offer more targeted and effective interventions.

These results raise concerns about equity in mental health diagnosis and care. Research has consistently shown that neurodevelopmental disorders are underdiagnosed in certain populations, particularly among women and racial or ethnic minorities (Wiggins et al., 2020; Loomes et al., 2017). In this sample, 135 participants reported being undiagnosed yet presented with symptoms, suggesting significant gaps in prior identification and care. These disparities may delay treatment and exacerbate substance use risk, especially in underserved student populations.

The results also have implications for the design of campus prevention and harm reduction initiatives. Programs that emphasize psychoeducation around neurodiversity and substance use that is delivered early in the college experience could empower students to seek support and recognize maladaptive patterns. Screening tools such as the TAPS Tool and ASRS-v1.1 could be integrated into orientation programs or health center visits, offering a low-cost, non-invasive method of identifying at-risk individuals (Gryczynski et al., 2017; Kessler et al., 2007).

7.1 Limitations

The screening tools used in this study (TAPS Tool 1 & 2, ASRS v1.1, and AQ-10 Short) are strong tools to use as indicators of substance use problems, ADHD, and/or ASD. They are all self-report screeners that can be utilized by any adult while retaining anonymity and allowing multiple different sub-factors to be identified. For example, in the TAPS Tool 1 & 2, varying issues with different drugs (stimulants, tobacco, alcohol, cannabis, heroin, opioid, or sedatives) and can indicate the problem areas of the participant (McNeely et al., 2017). The TAPS Tools are also good screeners for catching early signs of substance use problems as they ask participants about the frequencies partaking in substance use. In the ASRS v1.1 screening tool, it shows 2 different subtypes of ADHD (inattentiveness and hyperactivity/impulsivity) (Kessler et al., 2005). One of the larger limitations is that the AQ-10 Short does not directly address subtypes in relation to ASD, substituting it for a different ASD screener like the Autism Spectrum Quotient developed by Simon Baron-Cohen that is a long form version of the AQ-10 Short with approximately 50 questions (Baron-Cohen et al., 2001). Another limitation is the sample size. A larger age range might better serve to increase the likelihood of preventing addictive behaviors by catching it earlier while also giving older people a chance to halt habits.

Finally, these findings open several avenues for future research. Longitudinal studies are needed to determine causal pathways between neurodevelopmental traits and substance use patterns. Are symptoms of ADHD and ASD precursors to substance use, or does substance use exacerbate neurodevelopmental difficulties? Experimental and qualitative methods could also help illuminate the lived experiences of neurodivergent students who engage in substance use, offering richer insights than quantitative data alone.

Future research should also explore the role of co-occurring psychiatric disorders, such as anxiety, depression, and trauma, which frequently accompany both ADHD and ASD and may further compound substance use risk (Buckner et al., 2008; Koob & Volkow, 2016). Moreover, investigations into the efficacy of targeted interventions—such as dialectical behavior therapy for emotional regulation or executive function training—could provide evidence-based strategies for reducing substance use among these populations.

8. Conclusions

Young adult college students are an at-risk population in need of specific resources in the United States to ensure their safety and success. The high likelihood of developing substance use problems when presenting symptoms of neurodevelopmental disorders is dangerous considering the growing number of undiagnosed and diagnosed neurodevelopmental disorders in the U.S. Prevention. As has been previously stated, there is a high significance between substance abuse and having neurodevelopmental disorders.

References

American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev.). https://doi.org/10.1176/appi.books.9780890425787

Arria, A. M., & DuPont, R. L. (2010). Nonmedical prescription stimulant use among college students: Why we need to do something and what we need to do. *Journal of Addictive Diseases, 29*(4), 417–426. https://doi.org/10.1080/10550887.2010.509273

Ayano, G., Tsegay, L., Gizachew, Y., Necho, M., Yohannes, K., Abraha, M., Demelash, S., Anbesaw, T., & Alati, R. (2023). Prevalence of attention deficit hyperactivity disorder in adults: Umbrella review of evidence generated across the globe. Psychiatry Research, 328, 115449. https://doi.org/10.1016/j.psychres.2023.115449

Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., & Clubley, E. (2001). The autism-spectrum quotient (AQ): evidence from Asperger syndrome/high-functioning autism, males and females, scientists and mathematicians. *Journal of autism and developmental disorders*, *31*(1), 5–17. https://doi.org/10.1023/a:1005653411471

Barterian, J. (2023, July 12). *Is it ADHD or just distractedness?* Ohio State Health & Discovery | Health, wellness and innovation news. https://health.osu.edu/health/mental-health/adhd-or-distractedness

Benson, K., Flory, K., Humphreys, K. L., & Lee, S. S. (2015). Misuse of stimulant medication among college students: a comprehensive review and meta-analysis. *Clinical child and family psychology review*, *18*(1), 50–76. https://doi.org/10.1007/s10567-014-0177-z

Biederman, J., Monuteaux, M. C., Spencer, T., Wilens, T. E., Faraone, S. V., & Mick, E. (2008). Stimulant therapy and risk for subsequent substance use disorders in male adults with ADHD: A naturalistic controlled 10-year follow-up study. *The American Journal of Psychiatry, 165*(5), 597–603. https://doi.org/10.1176/appi.ajp.2007.07060936

Broman, C. L. (2005). Stress, race and substance use in college. *College Student Journal*, *39*(2). https://go.gale.com/ps/i.do?id=GALE%7CA133606104&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=01463934&p=AONE&sw=w&userGroupName=anon~b971af24&aty=open-web-entry

Buckner, J. D., Schmidt, N. B., Lang, A. R., Small, J. W., Schlauch, R. C., & Lewinsohn, P. M. (2008). Specificity of social anxiety disorder as a risk factor for alcohol and cannabis dependence. *Journal of Psychiatric Research, 42*(3), 230–239. https://doi.org/10.1016/j.jpsychires.2007.01.002

Butwicka, A., Långström, N., Larsson, H., Lundström, S., Serlachius, E., Almqvist, C., & Lichtenstein, P. (2017). Increased risk for substance use-related problems in autism spectrum disorders: A population-based cohort study. *Journal of Autism and Developmental Disorders, 47*(1), 80–89. https://doi.org/10.1007/s10803-016-2914-2

Capusan, A. J., Kuja-Halkola, R., Bendtsen, P., & Larsson, H. (2019). Comorbidity of ADHD and alcohol use disorder in adults: A twin study. *Addiction, 114*(7), 1294–1303. https://doi.org/10.1111/add.14562

Carter, G., Yu, Z., Aryana Bryan, M., Brown, J. L., Winhusen, T., & Cochran, G. (2022). Validation of the tobacco, alcohol, prescription medication, and other substance use (TAPS) tool with the WHO alcohol, smoking, and substance involvement screening test (ASSIST). Addictive Behaviors, 126, 107178. https://doi.org/10.1016/j.addbeh.2021.107178

Chandrasekhar, T. (2019). Supporting the needs of college students with autism spectrum disorder. Journal of American College Health, 68(8), 936–939. https://doi.org/10.1080/07448481.2019.1686003

Furr-Holden, C. D., Ialongo, N. S., Anthony, J. C., Petras, H., & Kellam, S. G. (2004). Developmentally inspired drug prevention: middle school outcomes in a school-based randomized prevention trial. Drug and alcohol dependence, 73(2), 149–158. https://doi.org/10.1016/j.drugalcdep.2003.10.002

Green, J. G., DeYoung, G., Wogan, M. E., Wolf, E. J., Lane, K. L., & Adler, L. A. (2019). Evidence for the reliability and preliminary validity of the Adult ADHD Self-Report Scale v1.1 (ASRS v1.1) Screener in an adolescent community sample. *International journal of methods in psychiatric research*, *28*(1), e1751. https://doi.org/10.1002/mpr.1751

Gryczynski, J., McNeely, J., Wu, L., Subramaniam, G. A., Svikis, D. S., Cathers, L. A., Sharma, G., King, J., Jelstrom, E., Nordeck, C. D., Sharma, A., Mitchell, S. G., O'Grady, K. E., & Schwartz, R. P. (2017). Validation of the TAPS-1: A four-item screening tool to identify unhealthy substance use in primary care. Journal of General Internal Medicine, 32(9), 990-996. https://doi.org/10.1007/s11606-017-4079-x

Harpin V. A. (2005). The effect of ADHD on the life of an individual, their family, and community from preschool to adult life. *Archives of disease in childhood*, *90 Suppl 1*(Suppl 1), i2–i7. https://doi.org/10.1136/adc.2004.059006

Hasin, D. S., O'Brien, C. P., Auriacombe, M., Borges, G., Bucholz, K., Budney, A., Compton, W. M., Crowley, T., Ling, W., Petry, N. M., Schuckit, M., & Grant, B. F. (2013). DSM-5 criteria for substance use disorders: Recommendations and rationale. *American Journal of Psychiatry*, *170*(8), 834-851. https://doi.org/10.1176/appi.ajp.2013.12060782

Hodges, H., Fealko, C., & Soares, N. (2020). Autism spectrum disorder: definition, epidemiology, causes, and clinical evaluation. *Translational pediatrics*, *9*(Suppl 1), S55–S65. https://doi.org/10.21037/tp.2019.09.09

Hodis, B., Mughal, S., & Saadabadi, A. (2025). Autism Spectrum Disorder. In *StatPearls*. StatPearls Publishing.

SurHoekstra, R. A., Vinkhuyzen, A. A., Wheelwright, S., Bartels, M., Boomsma, D. I., Baron-Cohen, S., Posthuma, D., & van der Sluis, S. (2011). The construction and validation of an abridged version of the autism-spectrum quotient (AQ-Short). Journal of autism and developmental disorders, 41(5), 589–596. https://doi.org/10.1007/s10803-010-1073-0

Johnston, L. D., Miech, R. A., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2021). *Monitoring the Future national survey results on drug use, 1975–2020: College students and adults ages 19–60*. Institute for Social Research, The University of Michigan.

Kent, E. C., Burgess, G. H., & Kilbey, E. (2018). Using the AQ-10 with adults who have a borderline or mild intellectual disability: Pilot analysis of an adapted AQ-10 (AQ-10-Intellectual disability). *Research in Autism Spectrum Disorders*, *54*, 65-75. https://doi.org/10.1016/j.rasd.2018.06.010

Kessler, R. C., Adler, L. A., Gruber, M. J., Sarawate, C. A., Spencer, T., & Van Brunt, D. L. (2007). Validity of the World Health Organization Adult ADHD Self-Report Scale (ASRS) Screener in a representative sample of health plan members. International journal of methods in psychiatric research, 16(2), 52–65. https://doi.org/10.1002/mpr.208

Koob, G. F., & Volkow, N. D. (2016). Neurobiology of addiction: A neurocircuitry analysis. *The Lancet Psychiatry, 3*(8), 760–773. https://doi.org/10.1016/S2215-0366(16)00104-8

Kronenberg, L. M., Slager-Visscher, K., Goossens, P. J. J., van Busschbach, J. J., & van Achterberg, T. (2014). Everyday life consequences of substance use in clients with severe mental illness. *Perspectives in Psychiatric Care, 50*(3), 199–205. https://doi.org/10.1111/ppc.12036

Lee, S. S., Humphreys, K. L., Flory, K., Liu, R., & Glass, K. (2011). Prospective association of childhood attention-deficit/hyperactivity disorder (ADHD) and substance use and abuse/dependence: a meta-analytic review. *Clinical psychology review*, *31*(3), 328–341. https://doi.org/10.1016/j.cpr.2011.01.006

Loomes, R., Hull, L., & Mandy, W. P. L. (2017). What is the male-to-female ratio in autism spectrum disorder? A systematic review and meta-analysis. *Journal of the American Academy of Child and Adolescent Psychiatry, 56*(6), 466–474. https://doi.org/10.1016/j.jaac.2017.03.013

Lu, W., Lopez-Castro, T., & Vu, T. (2023). Population-based examination of substance use disorders and treatment use among US young adults in the national survey on drug use and health, 2011–2019. *Drug and Alcohol Dependence Reports*, *8*, 100181. https://doi.org/10.1016/j.dadr.2023.100181

Maenner MJ, Warren Z, Williams AR, et al. Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2020. MMWR Surveill Summ 2023;72(No. SS-2):1–14. DOI: http://dx.doi.org/10.15585/mmwr.ss7202a1

Magnus W, Anilkumar AC, Shaban K. Attention Deficit Hyperactivity Disorder. [Updated 2023 Aug 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK441838/

Mathew, A. G., & Simon, S. S. (2024). Peer pressure, academic stress and self-regulation among college students. *International Journal For Multidisciplinary Research*, *6*(2). https://doi.org/10.36948/ijfmr.2024.v06i02.16930

McNeely J, Wu L, Subramaniam G, Sharma G, Cathers LA, Svikis D, et al.*Performance of the Tobacco, Alcohol, Prescription Medication, and Other Substance Use (TAPS) Tool for Substance Use Screening in Primary Care Patients.*Ann Intern Med. 2016;165:690-699. doi: 10.7326/M16-0317

Meinzer, M. C., Oddo, L. E., Garner, A. M., & Chronis-Tuscano, A. (2020). Helping College Students with Attention-Deficit/Hyperactivity Disorder SUCCEED: A Comprehensive Care Model. Evidence-Based Practice in Child and Adolescent Mental Health, 6(1), 11–27. https://doi.org/10.1080/23794925.2020.1796548

Molina, B. S. G., & Pelham, W. E. (2014). Attention-deficit/hyperactivity disorder and risk of substance use disorder: Developmental considerations, potential pathways, and opportunities for research. *Annual Review of Clinical Psychology, 10*, 607–639. https://doi.org/10.1146/annurev-clinpsy-032813-153722

Pasman, E., Blair, L., Solberg, M. A., McCabe, S. E., Schepis, T., & Resko, S. M. (2024). The substance use disorder treatment gap among US college students: Findings from the 2021 National Survey on Drug Use and Health. *Drug and alcohol dependence reports*, *12*, 100279. https://doi.org/10.1016/j.dadr.2024.100279

Ramos, M., Brooks, D., & Duque, M. (2013). Substance use and autism spectrum disorders: A systematic review. *Journal of Autism and Developmental Disorders, 43*(3), 517–528. https://doi.org/10.1007/s10803-012-1592-4

Ressel, M., Thompson, B., Poulin, M. H., Normand, C. L., Fisher, M. H., Couture, G., & Iarocci, G. (2020). Systematic review of risk and protective factors associated with substance use and abuse in individuals with autism spectrum disorders. *Autism : the international journal of research and practice*, *24*(4), 899–918. https://doi.org/10.1177/1362361320910963

Schulenberg, J. E., Patrick, M. E., Kloska, D. D., Maslowsky, J., Maggs, J. L., & O'Malley, P. M. (2018). Substance use in the transition to adulthood. In M. H. Bornstein (Ed.), *Handbook of parenting* (3rd ed., Vol. 5, pp. 375–414). Routledge.

Simon, V., Czobor, P., Bálint, S., Mészáros, A., & Bitter, I. (2009). Prevalence and correlates of adult attention-deficit hyperactivity disorder: meta-analysis. *The British journal of psychiatry : the journal of mental science*, *194*(3), 204–211. https://doi.org/10.1192/bjp.bp.107.048827

Srichawla, B. S., Telles, C. C., Schweitzer, M., & Darwish, B. (2022). Attention Deficit Hyperactivity Disorder and Substance Use Disorder: A Narrative Review. *Cureus*, *14*(4), e24068. https://doi.org/10.7759/cureus.24068

Storr, C. L., Ialongo, N. S., Kellam, S. G., & Anthony, J. C. (2002). A randomized controlled trial of two primary school intervention strategies to prevent early onset tobacco smoking. Drug and alcohol dependence, 66(1), 51–60. https://doi.org/10.1016/s0376-8716(01)00184-3

Sullivan, M. A., & Rudnik-Levin, F. (2001). Attention deficit/hyperactivity disorder and substance abuse. Diagnostic and therapeutic considerations. *Annals of the New York Academy of Sciences*, *931*, 251–270. https://doi.org/10.1111/j.1749-6632.2001.tb05783.x

U. S. Department Human Services, & Office Of The S. General. (2017). *Facing addiction in America: The surgeon general's report on alcohol, drugs, and health*.

van de Glind, G., van den Brink, W., Koeter, M. W., Carpentier, P. J., van Emmerik-van Oortmerssen, K., Kaye, S., Skutle, A., Bu, E. T., Franck, J., Konstenius, M., Moggi, F., Dom, G., Verspreet, S., Demetrovics, Z., Kapitány-Fövény, M., Fatséas, M., Auriacombe, M., Schillinger, A., Seitz, A., Johnson, B., … Levin, F. R. (2013). Validity of the Adult ADHD Self-Report Scale (ASRS) as a screener for adult ADHD in treatment seeking substance use disorder patients. *Drug and alcohol dependence*, *132*(3), 587–596. https://doi.org/10.1016/j.drugalcdep.2013.04.010

Walhout, S. J., van Zanten, J., DeFuentes-Merillas, L., Sonneborn, C. K., & Bosma, M. (2022). Patients With Autism Spectrum Disorder and Co-occurring Substance Use Disorder: A Clinical Intervention Study. *Substance abuse : research and treatment*, *16*, 11782218221085599. https://doi.org/10.1177/11782218221085599

Wechsler, H., Lee, J. E., Kuo, M., & Lee, H. (2002). College binge drinking in the 1990s: A continuing problem. *Journal of American College Health, 50*(5), 203–217. https://doi.org/10.1080/07448480209595713

Welsh, J. W., Shentu, Y., & Sarvey, D. B. (2019). Substance use among college students. *Focus*, *17*(2), 117-127. https://doi.org/10.1176/appi.focus.20180037

Wiggins, L. D., Durkin, M., Esler, A., Lee, L. C., Zahorodny, W., Rice, C., Yeargin-Allsopp, M., Dowling, N. F., Hall-Lande, J., Morrier, M. J., Christensen, D., Shenouda, J., & Baio, J. (2020). Disparities in Documented Diagnoses of Autism Spectrum Disorder Based on Demographic, Individual, and Service Factors. *Autism research : official journal of the International Society for Autism Research*, *13*(3), 464–473. https://doi.org/10.1002/aur.2255

Wilens, T. E., & Spencer, T. J. (2010). Understanding attention-deficit/hyperactivity disorder from childhood to adulthood. *Postgraduate Medicine, 122*(5), 97–109. https://doi.org/10.3810/pgm.2010.09.2206

Wilens, T. E., Morrison, N. R., & Prince, J. B. (2011). An update on the pharmacotherapy of attention-deficit/hyperactivity disorder in adults. *Expert Review of Neurotherapeutics, 11*(10), 1443–1465. https://doi.org/10.1586/ern.11.135

Williams, O. C., Prasad, S., McCrary, A., Jordan, E., Sachdeva, V., Deva, S., Kumar, H., Mehta, J., Neupane, P., & Gupta, A. (2023). Adult attention deficit hyperactivity disorder: a comprehensive review. *Annals of medicine and surgery (2012)*, *85*(5), 1802–1810. https://doi.org/10.1097/MS9.0000000000000631